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(54) Title: **DIGITAL DC-DC CONVERTER USING DIGITAL MODULATION**

(57) Abstract: A digital DC-DC converter is implemented using first-order delta-sigma modulation, rather than A/D conversion. In the DC-DC converter, a PWM generator 210 converts an input DC voltage to a preset level DC voltage according to an input PWM signal. A converter 220 converts the DC voltage from the PWM generator 210 to a preset level voltage. A delta-sigma modulator 230 converts a feedback voltage V<sub>fd</sub> corresponding to the output voltage V<sub>out</sub> of the converter 220 to a 1-bit digital voltage V<sub>o</sub> according to a preset reference voltage V<sub>ref</sub>. A counter 240 counts logic 1's in 1-bit digital voltage signals V<sub>o</sub> from the delta-sigma modulator 230. A delay controller 250 controls a high-level delay time according to the number of logic 1's counted by the counter 240 and transfers a PWM signal having the controlled high-level delay time to the PWM generator 210.



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